

## ABSTRACT OF THE DISCLOSURE

An improved water heater for use in spas, hot tubs, pools, hydrotherapy pools, bath tubs, and similar bodies of water used indoors, outdoors, or both indoors and outdoors are used for both therapeutic and recreational purposes. The water heater uses heating element technology know as thick film on substrate comprising resistive elements bonded to the outer dry surface of a pipe to heat the pipe which in turn heats the water flowing therethrough. The heater is highly efficient due to the direct contact of the wet heating surface with the water and provides a smooth seamless inner heating surface by eliminating the need to pass electrical leads into the wet region of the heater. This virtually eliminates the risk of leaks in the water heater due to bulkhead fittings. The invention further eliminates the need for a heating element to be contained in the inner wet region of a spa heater, thereby reducing the risk of corrosion. The water heater is used in combination with an electronic controller having a microprocessor to control and regulate the operation of the water heater. The water heater can be used with electrical, electro-mechanical, and mechanical control systems for spas and can be retrofitted into existing spa applications.